

Overcoming constraints to growth in biofuels industry

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Editor's note: This article presents findings of Booze Allen Hamilton, a consulting firm headquartered in McLean, VA. The article does not reflect official positions of the U.S. Department of Agriculture or any other government entity. The author of this article recently retired from USDA.

The U.S. Department of Agriculture asked Booze Allen Hamilton (BAH) to identify the obstacles to rapid expansion of the biofuels industry and actions to overcome those barriers. The target is U.S. production and use of 60 billion gallons per year (BGY) of biofuels by 2025. This would meet 17 percent of the projected 250 BGY United States transportation fuel demand for 2025.

Expanded domestic biofuels production and use will have several important benefits, including: 1) lessen our dependence on foreign oil; 2) improve the environment; 3) reduce U.S. foreign trade deficits; 4) enhance the economic well-being and quality of life for rural Americans.

The 60 BGY target represents what policymakers believe to be the most aggressive, yet achievable, goal for biofuel production (i.e., ethanol and, to a much lesser extent, biodiesel) in the United States. BAH concludes that the goal is attainable, but will require significant technological, logistical and socio-economic changes to the current

system of producing, transporting and using transportation fuels.

Initial findings

Most biofuels production today is corn-based ethanol, most of which is used as an additive to petroleum-based gasoline, producing a blend of 90 percent gasoline and 10 percent ethanol.

As early as 2012, BAH says ethanol production from corn will reach 15 BGY. This will saturate the current blend market and the use of corn for ethanol production will begin to adversely impact other uses of corn, notably as livestock feed.

Further growth of the biofuels industry will require a new set of government policies that will facilitate the development of new, dedicated energy crops, commonly referred to as cellulosic feedstocks. Additional policy initiatives will be needed to encourage investment in infrastructure and distribution capacity that will make high-blend fuels – such as an 85 percent ethanol fuel (E85) – readily available and cost competitive with fuels entirely or primarily produced from oil. Finally, drivers will have to want to purchase and have easy access to affordable vehicles that operate efficiently on biofuels.

BAH found that as annual biofuels industry production progresses towards 60 BGY, constraints will arise in all four major components of the biofuels value chain (feedstock, conversion, transport and end use). The BAH report identifies those constraints and recommends actions that USDA and other government institutions can take

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to address them. Forward thinking is essential to coordinate the simultaneous expansion throughout the biofuels value chain that is necessary to avert constraints which could cripple the industry.

Feedstock

Feedstock production involves the growth and harvesting of traditional crops such as corn and soy, future dedicated energy crops and biomass available from forest and agricultural resources.

BAH found that significant feedstock constraints are:

- Land and water use requirements for feedstock production sufficient to supply a 60 BGY biofuels market are not well understood;
- Severe drought and low crop yields could significantly impact the feedstock availability for conversion to biofuels;
- Current re-enrollment of CRP land is high and there is no incentive for land reintroduction for growing dedicated energy crops.



Moving increased volumes of ethanol will require expanded and innovative transportation systems. Rail tanker-car construction is backlogged 18 months, and some rail spurs are already overburdened. USDA photo by Dan Campbell

The recommended action to address feedstock constraints is to create a mechanism to determine what agricultural practices must be present in 2025 to support a 60 BGY biofuels market and still meet food and feed requirements. This study should examine:

- The balance between existing agriculture and introduction of new energy crops;
- The pace of land introduction and/or conversion needed to meet future biofuels feedstock production requirements;
- The potential of introducing drought- and pest-tolerant and high-yield seed hybrids;
- The benefits of creating a "strategic crop reserve" as a hedge against low crop yields;
- How subsidies could impact the production of new feedstocks/dedicated energy crops;
- How improved feedstock densification processes can lower costs and risks of biofuels facilities.

Conversion

Ethanol and biodiesel plants each have their own unique processes for

converting renewable feedstocks into biofuels. A sustainable American biofuels industry capable of replacing a significant amount of imported oil will require new technologies which can convert different and more plentiful renewable resources into biofuels.

The significant conversion constraints are:

- Environmental challenges of conversion technologies affect potential plant siting;
- Economics of new bioconversion technologies are highly dependent on volatile feedstock and biofuels prices.
- Biodiesel production is well below existing refinery capacity.

The recommended actions to address these conversion constraints are:

- Work with states to determine how emerging carbon trading programs, water rights issues and air permitting requirements will impact biofuels industry development;
- Create a biofuels security subsidy with a price floor on oil and a price ceiling for feedstock outside of which government support would be triggered to maintain positive economics within the biofuels industry;

- Create additional Renewable Fuels Standards specifically for E85 and biodiesel to increase both nationwide availability and demand of E85 and biodiesel.

Transport

Current biorefining finished product volumes are small enough that barge, rail and truck shipments are economical and efficient. But moving a greatly enlarged amount of product from dispersed biorefineries to local fuel terminals will require expanded and innovative transportation systems.

The significant transport constraints are:

- The existing biofuels transport infrastructure is incapable of supporting 60 BGY of biofuels;
- Rail tank-car construction is backlogged 18 months and rail spur lines are becoming overburdened with current shipments of freight and fuel;
- No determination has been made as to the feasibility of converting existing petroleum pipelines to accommodate biofuels;
- There is a long permitting process

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required for construction of new pipelines.

The recommended actions to address these transport constraints include:

- Determine the government's role to ensure adequate biofuels transportation capacity;
- Determine when the current biofuels transport infrastructure will be pushed beyond its capacity to accommodate additional volume;
- Examine opportunities to modify existing pipelines or use existing rights of way to transport biofuels;
- Fund research on reducing siting and construction constraints to enable infrastructure development necessary to support rapid industry expansion;
- Conduct analysis on the "least-cost" strategy for handling the transition to a 60 BGY future.

End use

Biofuels will reach their potential only if energy companies, vehicle manufacturers, retail service stations and consumers all have sufficient incentives to change their operations and habits to embrace renewable fuels. Like the change from leaded to unleaded gasoline, this will require a clear and sustained campaign to match supply and demand on an evolving basis.

The significant end-use constraints are:

- As ethanol production moves beyond 15 BGY, a significant increase in consumer demand for E85 will be required to support increased ethanol production;
- Current E85 and biodiesel retail availability is limited;
- Current production and sale of flexible fuel vehicles (FFVs), capable of running smoothly on either gasoline or biofuels, is limited;
- Additional outlets for ethanol are not established to accommodate an imbalance where supply exceeds national fuel demand.

The recommended actions to address these end-use constraints include:

- Sponsor public education programs to increase consumer demand for biofuels and FFVs;
- Create a national corridor of biofuels refueling stations to increase availability and encourage purchase of both E85 and biodiesel;
- Work closely with auto manufacturers to establish incentives to increase production of FFVs;
- Develop an export market for U.S. ethanol to support continued ethanol industry expansion through a possible slow transition to E85.

Failing to address the critical issues facing the biofuels industry will lead to bottlenecks which constrain continued rapid industry expansion and limit its capacity to lessen America's dependence on foreign oil. It will also hamper efforts to improve the environment, reduce trade deficits and enhance the economic well-being of rural America.

Eliminating these constraints will require considerable discussion and coordination with states and industry to determine the benefits and risks of various government interventions. While the range of issues and stakeholders is large, the timeframe for ethanol's transition beyond 15 BGY provides an opportunity for robust debate and for developing reasoned responses. The time to begin is now. ■

have to strategically respond to them if we want to remain competitive."

For instance, he says, recent consumer focus on healthier eating has created more incentives for companies to expand their product offerings. "That's what we're doing with production of the soybean oil," Boulis says. "We're also responding to the agriculture industry's demand by providing our high-end soy meal for use in their feeding practices. I think adaptability is the key to our business success."

Reducing transportation costs

As Mercer consolidates its operations and brings its soybean processing plant to full capacity, it eliminates the roundtrip costs of transporting soybeans to regional processors. Since Mercer currently buys soy meal from these same regional processors and has it shipped back to Ohio, bringing the plant into production will reduce product transportation costs by more than 50 percent.

Additionally, health benefits from using trans-fat-free oils are triggering an increase in consumer demand. Major fast food chains and food manufacturers either have changed, or are considering changing to trans-fat-free oils in their food preparations. These developments have helped to validate Mercer's market projections and its decision to initiate this new venture.

Cooperatives exist for the single purpose of improving the business profitability of their members. The commitment of Mercer's management and its ability to reach beyond current operations and find new venues to generate positive financial returns reflect the spirit and mission of all cooperatives. ■